



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

from which $B^2 = .918904$ and $B = .9586$. Substituting the value of B^2 in the expression for DE , $DE = OO' = 8.5432$. Then $DE = OO' - 2B = 6.626$, and $EK = \sqrt{[(30)^2 + (2)^2 - (6.626)^2]} = 29.3274$ feet, or 29 feet 3.9288 inches, the length of car required.

Also solved by the late *P. H. PHILBRICK*, who obtained as a result, 29.168 feet.

CALCULUS.

155. Proposed by *F. P. MATZ*, Sc. D., Ph. D., Professor of Mathematics and Astronomy in Defiance College Defiance, Ohio.

Solve the differential equations:

$$(A). \quad \frac{d^4 y}{dx^4} + 2 \frac{d^2 y}{dx^2} = \sin 2x + \sin x - x. \quad (B). \quad \frac{d^2 y}{dx^2} + 2 \frac{dy}{dx} = \sin 2x + \sin x - x.$$

Solution by *CHRISTIAN HORNING*, A. M., Heidelberg University, Tiffin, O., and *LON C. WALKER*, A. M., Leland Stanford University.

Using the symbolic method (A) becomes $(D^4 + 2D^2)y = \sin 2x + \sin x - x$. The complementary function is $c_1 + c_2 x + c_3 \cos \sqrt{2}x + c_4 \sin \sqrt{2}x$, and the particular integral

$$\begin{aligned} &= \frac{1}{D^2(D^2 + 2)}(\sin 2x + \sin x - x) = \frac{1}{D^2} \cdot \frac{1}{D^2 + 2} \sin 2x + \frac{1}{D^2} \cdot \frac{1}{D^2 + 2} \sin x - \\ &\quad \frac{1}{D^2 + 2} \cdot \frac{1}{D^2} x = \frac{1}{8} \sin 2x - \sin x - (2 + D^2)^{-1} \cdot \frac{x^3}{6} = \frac{1}{8} \sin 2x - \sin x - \frac{x^3}{12} + \frac{1}{4}x. \end{aligned}$$

$\therefore y = c_1 + c_2 x + c_3 \cos \sqrt{2}x + c_4 \sin \sqrt{2}x + \frac{1}{8} \sin 2x - \sin x - \frac{1}{12} x^3$ ($\frac{1}{4}x$ being included in $c_2 x$); and (B) becomes $(D^2 + 2D)y = \sin 2x + \sin x - x$.

\therefore The complementary function is $c_1 + c_2 e^{-2x}$, and the particular integral

$$\begin{aligned} &= \frac{1}{D^2 + 2D}(\sin 2x + \sin x - x) = \frac{1}{D^2 + 2D} \sin 2x + \frac{1}{D^2 + 2D} \sin x - \frac{1}{D + 2} \cdot \frac{1}{D} x \\ &= \frac{1}{2D - 4} \sin 2x + \frac{1}{2D - 1} \sin x - (2 + D)^{-1} \cdot \frac{1}{2} x^2 \\ &= \frac{1}{2} \cdot \frac{D + 2}{D^2 - 4} \sin 2x + \frac{2D + 1}{4D^2 - 1} \sin x - \left(\frac{1}{2} - \frac{1}{4}D + \frac{1}{8}D^2\right) \frac{1}{2} x^2 \\ &= -\frac{1}{8}(D + 2) \sin 2x - \frac{1}{8}(2D + 1) \sin x - \frac{1}{4} x^2 + \frac{1}{4} x - \frac{1}{8} \\ &= -\frac{1}{8} \cos 2x - \frac{1}{8} \sin 2x - \frac{1}{8} \cos x - \frac{1}{8} \sin x - \frac{1}{4} x^2 + \frac{1}{4} x - \frac{1}{8}. \end{aligned}$$

$\therefore y = c_1 + c_2 e^{-2x} - \frac{1}{8}(\cos 2x + \sin 2x) - \frac{1}{8} \cos x - \frac{1}{8} \sin x - \frac{1}{4} x^2 + \frac{1}{4} x$, ($-\frac{1}{8}$ being included in the term c_1).

Also solved by *J. SCHEFFER*, *W. W. LANDIS*, *G. W. GREENWOOD*, and *WILLIAM HOOVER*.